Abstract

What are the units stored in the lexicon? On the lexical level, there is disagreement about the storage of morphemes (e.g., Bybee 1985, Stockall and Marantz 2005), regularly inflected words (e.g., Bybee 1985, Pinker 1999), and high-frequency phrases, prelexical (Bybee and Schoedelmann 1989, Solomon et al. 2005). On the sublexical level, there is disagreement about the psychological reality of segments (Port and Leary 2005, Nearey 1997), rimes (Keenan and Tressman 1997, Yoon and Danesi 2001, Prenenthals and Hain 1995, Vennemann 1988), and syllables (Ferrand et al. 1996, Schiller 1997). This paper introduces a new method for testing psychological reality of potentially decomposable linguistic units, XOR learning. We show that English speakers learn associations of rimes better than they learn associations of bodies, suggesting that the rime is a unit in English while the body is not.

Definitions

• XOR learning: the whole is associated with a different response than both of its parts.

Three models of constituency

1. Constituency is connection strength (e.g., Vennemann 1988).

2. Constituency is unit formation (e.g., Yoon and Danesi 2001).

3. Constituency is unit prominence (Bod 1998).

Research Questions

• Are rimes more or less associative than bodies?

• Can English speakers associate both rimes and bodies?

• Are segments more associative than rimes and bodies?

Methods

Subject groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Prefixes</th>
<th>Rimes</th>
<th>Bodies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V, C</td>
<td>V, C</td>
<td>V, C</td>
</tr>
<tr>
<td>2</td>
<td>V, C</td>
<td>V, C</td>
<td>V, C</td>
</tr>
<tr>
<td>3</td>
<td>V, C</td>
<td>V, C</td>
<td>V, C</td>
</tr>
<tr>
<td>4</td>
<td>V, C</td>
<td>V, C</td>
<td>V, C</td>
</tr>
</tbody>
</table>

Regularities to learn

- Group 1: V, C
- Group 2: V, C
- Group 3: V, C
- Group 4: V, C

Research Questions

• Are rimes more or less associative than segments?

• Are bodies or rimes more associative than bodies?

Model Evaluation

Model 1: Rimes are more associative than bodies.

Model 2: Both rimes and bodies can be associated with other units, and prominent units tend to be less associative.

Conclusion

XOR learning is a useful tool for studying the nature of constituency. It has wide applicability to issues in the mental lexicon, phonology, morphology, and syntax. In this paper we have shown that rimes are more associative than bodies, a result that supports the traditional model of the English syllable and localist representation in general. The existence of vowels as separate units is, however, in question.

Results

Subjects learn rime-affix but not body-affix associations (p<0.005).

XOR learning is a useful tool for studying the nature of constituency. It has wide applicability to issues in the mental lexicon, phonology, morphology, and syntax. In this paper we have shown that rimes are more associative than bodies, a result that supports the traditional model of the English syllable and localist representation in general. The existence of vowels as separate units is, however, in question.
Further controls

If the rime-body difference was due to the fact that ‘ash’ is a word, we would expect the two rimes ‘ash’ and ‘ug’ to show differences in associability. The figures below show that they do not.

If rime associations were illusions generated by segment associations, accuracy on segments would fall significantly below chance when rime associations are introduced into training. The figures below show that this does not happen.

N.B.: These particular rimes and bodies were chosen so that the rime would not be less frequent than the body, since frequent units are less associable and so that codas and onsets do not differ in frequency of occurrence. Frequency estimates were obtained from the MRC Psycholinguistics Database (Coltheart 1981), the Hoosier Mental Lexicon (Nusbaum et al. 1984) and Kessler and Treiman (1997).

References:
Bybee, J., and J. Scheibman. 1999. The effect of usage on degrees of constituency the reduction of don’t in English. Linguistics 37. 4- 575-596.

Acknowledgements: many thanks to NIH for funding, Adam Buchwald, Susannah Levi, and David Pisoni for helpful feedback, to Luis Hernandez for help with making the program used to present the stimuli, and to Nicholas Alteni for pronouncing the stimuli.

It is not the case that rime and body associations improve by the same amount as a result of training. Even though rime-suffix condition sticks out pre training on wholes, there is no correlation between performance on wholes prior to after training.

Further controls

If the rime-body difference was due to the fact that ‘ash’ is a word, we would expect the two rimes ‘ash’ and ‘ug’ to show differences in associability. The figures below show that they do not.

If rime associations were illusions generated by segment associations, accuracy on segments would fall significantly below chance when rime associations are introduced into training. The figures below show that this does not happen.

N.B.: These particular rimes and bodies were chosen so that the rime would not be less frequent than the body, since frequent units are less associable and so that codas and onsets do not differ in frequency of occurrence. Frequency estimates were obtained from the MRC Psycholinguistics Database (Coltheart 1981), the Hoosier Mental Lexicon (Nusbaum et al. 1984) and Kessler and Treiman (1997).

References:
Bybee, J., and J. Scheibman. 1999. The effect of usage on degrees of constituency the reduction of don’t in English. Linguistics 37. 4- 575-596.